

## Claims:

1. A reactive dye compound comprising:

(a) at least one chromophore moiety  
(b) at least one  $\text{SO}_2\text{C}_2\text{H}_4$  group which is attached to the chromophore moiety either directly via the sulphur atom of the  $\text{SO}_2\text{C}_2\text{H}_4$  group or via a linking group L;

characterised in that at least one  $\text{SO}_2\text{C}_2\text{H}_4$  group is substituted on its terminal carbon atom with at least one Y group wherein Y is  $-A(\text{CO})R^*$  wherein A is selected from O or S and wherein  $R^*$  is an organic residue which contains at least one nucleophilic group, such as OH, NH<sub>2</sub>, SH, COOH, N, NHR<sup>1</sup> and NR<sup>1</sup>R<sup>2</sup> wherein R<sup>1</sup> and R<sup>2</sup> may be the same or different and may be selected from C1-C4 alkyl; and salts thereof.

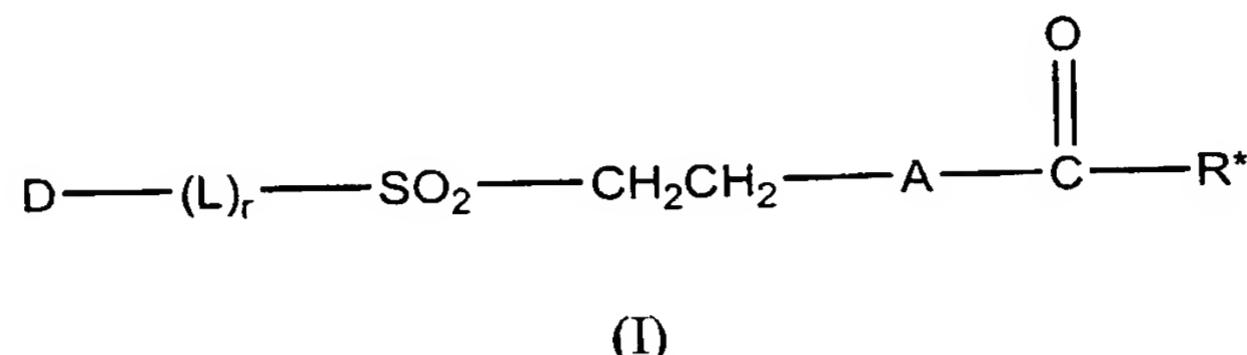
2. A reactive dye compound according to Claim 1 wherein  $R^*$  is selected from  $(\text{CH}_2)_n\text{SH}$ ,  $(\text{CH}_2)_n\text{NH}_2$ ,  $\text{CH}(\text{CH}_3)\text{OH}$ ,  $\text{CH}(\text{CH}_3)\text{O}(\text{CO})\text{CH}(\text{CH}_3)\text{OH}$  (i.e. a polyester of lactic acid),,  $R^*$  derived from a polyester of citric acid,  $\text{CH}(\text{OH})(\text{CH}_2\text{COOH})_2$ ,  $\text{CH}_2(\text{OH})(\text{CO}_2\text{H})\text{CH}_2\text{COOH}$ ,  $\text{C}(\text{OH})(\text{H})\text{CH}_2\text{COOH}$ ,  $\text{CH}_2\text{C}(\text{H})(\text{OH})\text{COOH}$ ,  $\text{C}(\text{OH})(\text{H})\text{C}(\text{OH})(\text{H})\text{COOH}$ ,  $(\text{CH}_2)_n\text{NHR}^1$ ,  $\text{CH}_2\text{NR}^1\text{R}^2$ ,  $\text{CH}_2\text{NHNH}_2$ ,  $\text{CH}_2\text{NHOH}$ ,  $\text{CH}_2\text{SMe}$ ,  $\text{CHNH}_2(\text{CH}_2)_n(\text{COOH})$ ,  $\text{CHNH}_2\text{CH}_2\text{SMe}$ ,  $\text{CHNH}_2\text{CH}_2\text{SSCH}_2\text{CHNH}_2\text{COOH}$ ,  $\text{CHNH}_2\text{CH}_2\text{SO}_3\text{H}$ ,  $\text{C}_6\text{H}_4\text{OH}$ ,  $\text{C}_6\text{H}_4\text{COOH}$ ,  $\text{C}_6\text{H}_4\text{NH}_2$ ,  $\text{C}_6\text{H}_4\text{N}$ ,  $(\text{CH}_2)_n\text{C}_6\text{H}_4\text{N}$ ,  $\text{CH}(\text{R}\#)\text{NH}_2$ ,  $(\text{CH}_2)_n\text{-SSO}_3^-$ ,  $(\text{CH}_2)_n\text{-S-S-}$  ( $\text{CH}_2)_n$ , peptide of polypeptide, wherein R<sub>1</sub> and R<sub>2</sub> is independently selected from C<sub>1</sub>-C<sub>4</sub> alkyl, wherein n is an integer in the range of 1 to 4 wherein within the same molecule n is not necessarily the same integer and wherein R# corresponds to an amino acid sidechain.

3. A reactive dye according to Claim 1 or 2 wherein  $R^*$  is selected  
 $(\text{CH}_2)_n\text{SH}$ ,  $(\text{CH}_2)_n\text{NH}_2$ ,  $\text{C}_6\text{H}_4\text{N}$ ,  $\text{CH}(\text{R}\#)\text{NH}_2$ ,  $\text{CH}(\text{CH}_3)\text{OH}$ ,  
 $\text{CH}(\text{CH}_3)\text{O}(\text{CO})\text{CH}(\text{CH}_3)\text{OH}$ ,  $\text{C}(\text{OH})(\text{CH}_2\text{COOH})_2$ ,  
 $\text{CH}_2\text{C}(\text{OH})(\text{COOH})\text{CH}_2\text{COOH}$ ,  $\text{C}(\text{H})(\text{CH}_3)\text{OH}$ ,  $\text{C}(\text{H})(\text{OH})\text{CH}_2\text{COOH}$ ,  
 $\text{CH}_2\text{C}(\text{H})(\text{OH})\text{COOH}$ ,  $\text{C}(\text{H})(\text{OH})\text{C}(\text{H})(\text{OH})\text{COOH}$ ,  $\text{C}_6\text{H}_4\text{OH}$ ,  $\text{C}_6\text{H}_4\text{NH}_2$ .

4. A reactive dye compound according to any of Claims 1 to 3 wherein  $R^*$  is  $\text{C}(\text{OH})(\text{CH}_2\text{COOH})_2$  or  $\text{CH}_2\text{C}(\text{OH})(\text{COOH})\text{CH}_2\text{COOH}$ .

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5. A reactive dye compound according to any of Claims 1 to 4 wherein A is O.
6. A reactive dye compound having the formula (I):

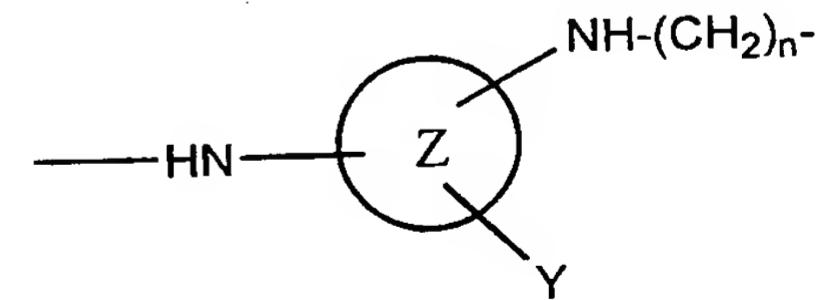
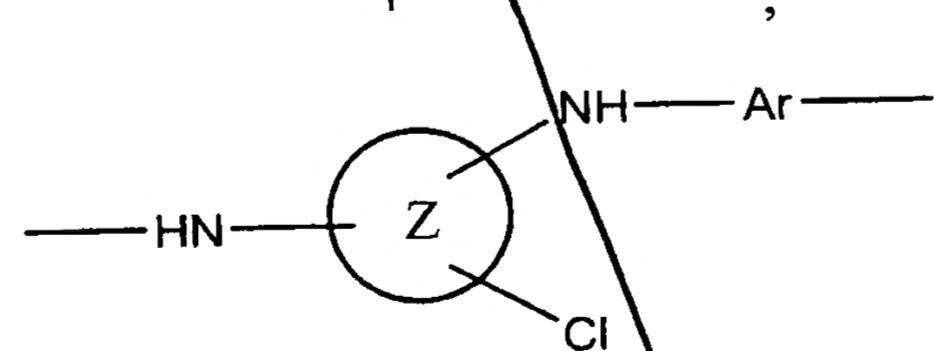
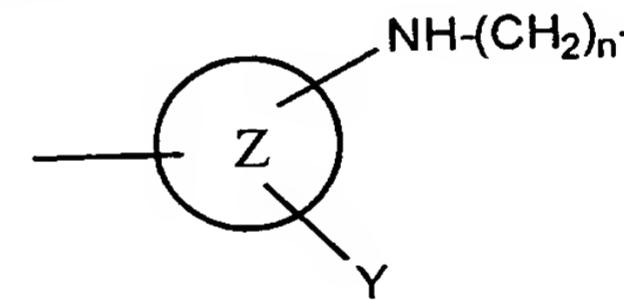
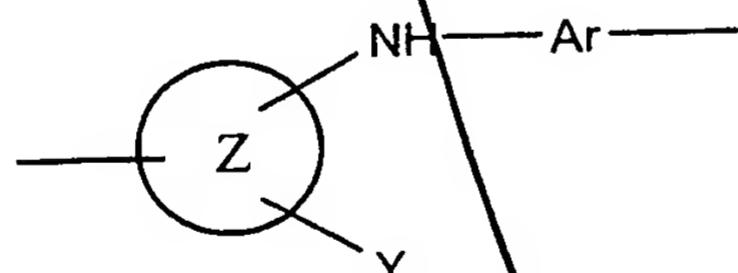
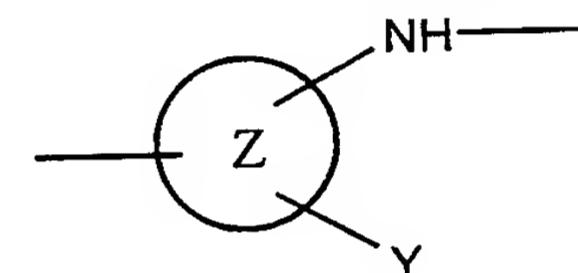
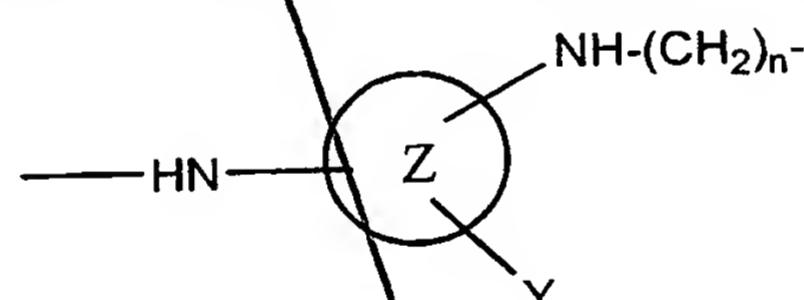


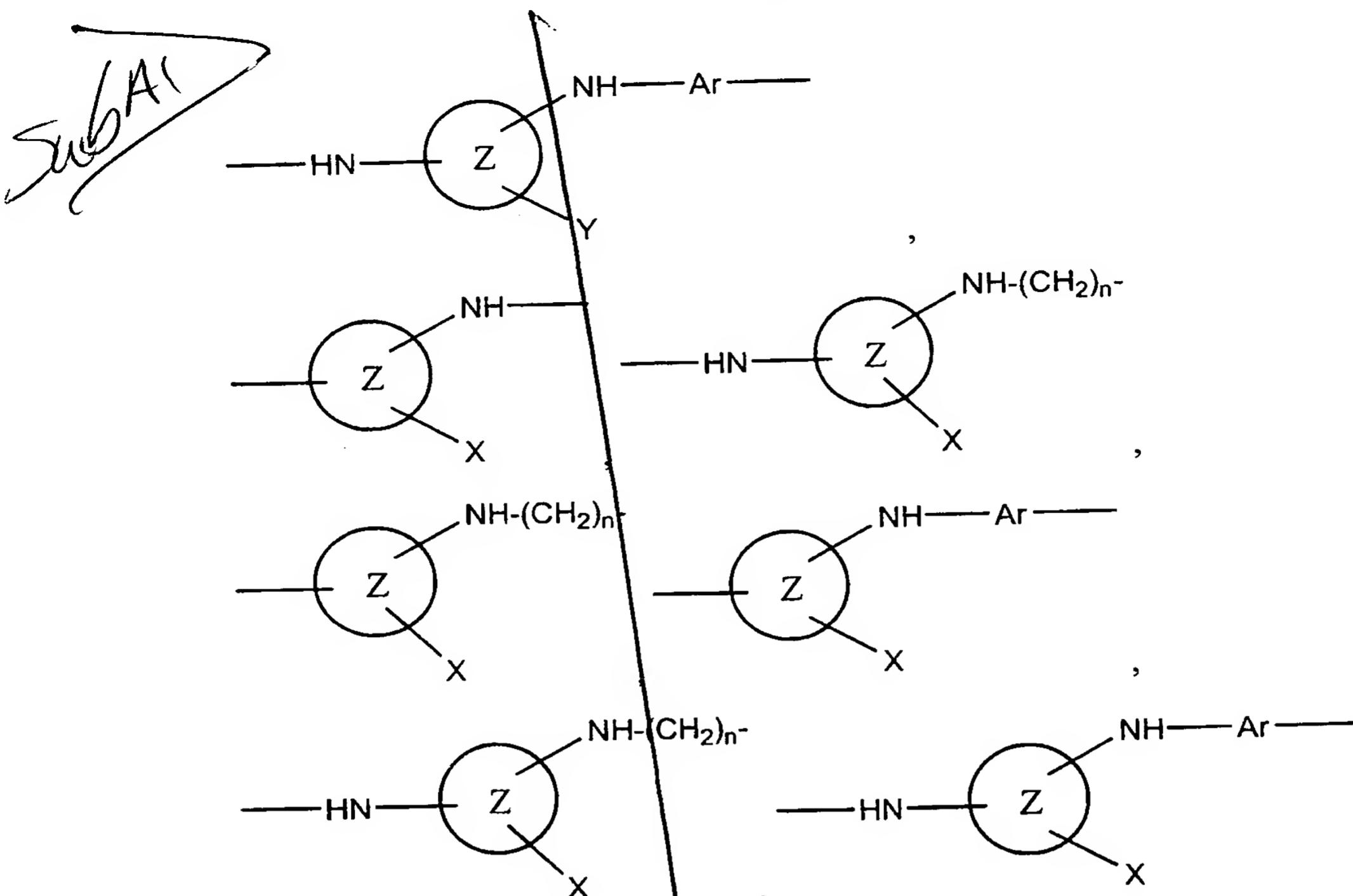
wherein: D is a chromophore group;

r is 0 or 1;

L is a linking group selected from NH,  $(\text{CH}_2)_n$ ,  $\text{N}-(\text{CH}_2)_n\text{N}$ ,  $-(\text{CH}_2)_n-\text{N}$ ,

NR (R is C1-C4 alkyl), ,





wherein Ar is an aryl group, preferably benzene, Y is halogen or  $O(C=O)R^*$ , n is an integer of from 1 to 4, Z is a nitrogen-containing heterocycle, X is selected from thio-derivatives, halogen (preferably fluorine and chlorine), amines, alkoxy groups, carboxylic acid groups, CN, N<sub>3</sub>, and quaternized nitrogen derivatives, Q<sup>+</sup>;

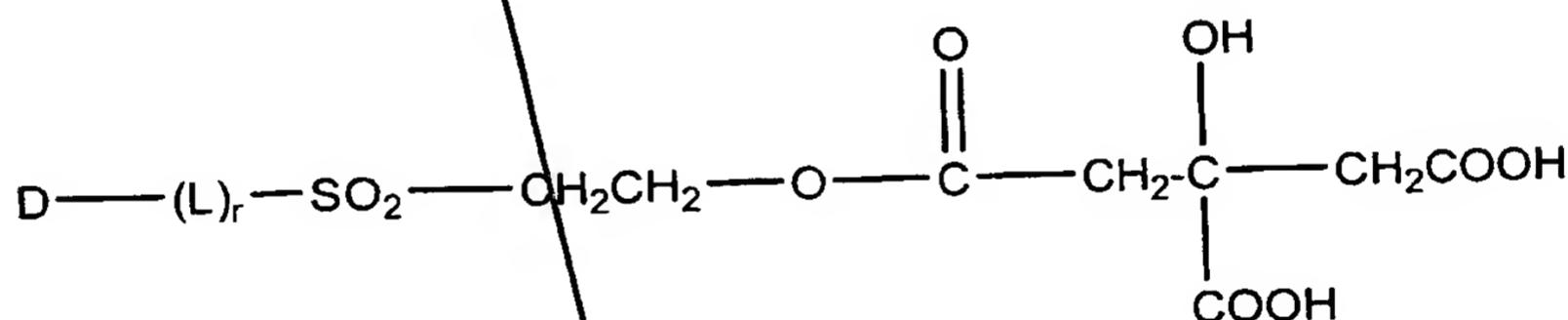
A is O or S,

$R^*$  is selected from  $(CH_2)_nSH$ ,  $(CH_2)_nNH_2$ ,  $CH(CH_3)OH$ ,  $CH(CH_3)O(CO)CH(CH_3)OH$  (i.e. a polyester of lactic acid),  $R^*$  derived from a polyester of citric acid,  $CH(OH)(CH_2COOH)_2$ ,  $CH_2(OH)(CO_2H)CH_2COOH$ ,  $C(OH)(H)CH_2COOH$ ,  $CH_2C(H)(OH)COOH$ ,  $C(OH)(H)C(OH)(H)COOH$ ,  $(CH_2)_nNHR^1$ ,  $CH_2NR^1R^2$ ,  $CH_2NHNH_2$ ,  $CH_2NHOH$ ,  $CH_2SMe$ ,  $CHNH_2(CH_2)_n(COOH)$ ,  $CHNH_2CH_2SMe$ ,  $CHNH_2CH_2SSCH_2CHNH_2COOH$ ,  $CHNH_2CH_2SO_3H$ ,  $C_6H_4OH$ ,  $C_6H_4COOH$ ,  $C_6H_4NH_2$ ,  $C_6H_4N$ ,  $(CH_2)_nC_6H_4N$ ,  $CH(R\#)NH_2$ ,  $(CH_2)_nSSO_3^-$ ,  $(CH_2)_n-S-S-(CH_2)_n$ ,  $R^*$  derived from peptide or polypeptide linked to the vinylsulphone group via its terminal carboxylic acid group, wherein  $R_1$  and  $R_2$  is independently selected from C<sub>1</sub>-C<sub>4</sub> alkyl,

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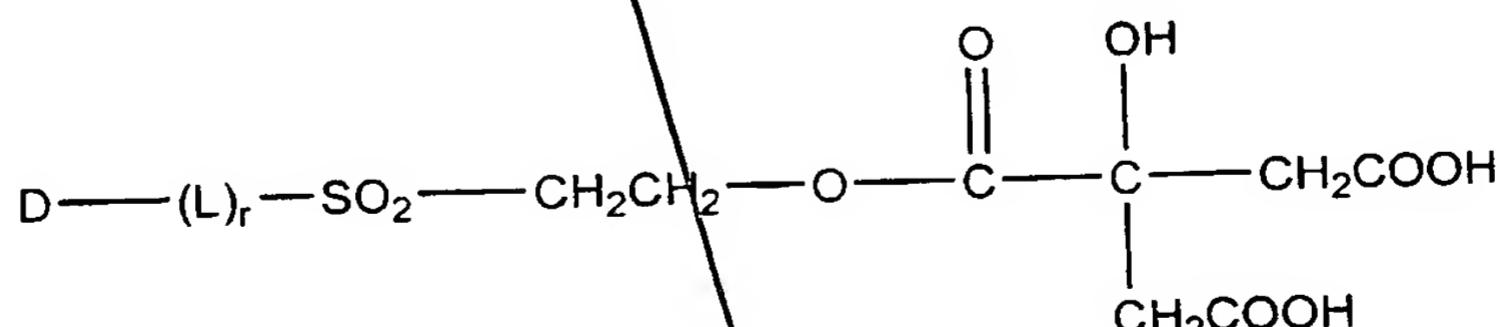
wherein n is an integer in the range of 1 to 4 wherein within the same molecule n is not necessarily the same integer and wherein R# corresponds to an amino acid sidechain;  
and salts thereof.

7. A reactive dye according to Claim 6 wherein R\* is selected from  $(CH_2)_nSH$ ,  $(CH_2)_nNH_2$ ,  $C_6H_4N$ ,  $CH(R\#)NH_2$ ,  $CH(CH_3)OH$ ,  $CH(CH_3)O(CO)CH(CH_3)OH$ ,  $C(OH)(CH_2COOH)_2$ ,  $CH_2C(OH)(COOH)CH_2COOH$ ,  $C(H)(CH_3)OH$ ,  $C(H)(OH)CH_2COOH$ ,  $CH_2C(H)(OH)COOH$ ,  $C(H)(OH)C(H)(OH)COOH$ ,  $C_6H_4OH$ ,  $C_6H_4NH_2$ .
8. A reactive dye according to Claim 6 or 7 wherein R\* is  $C(OH)(CH_2COOH)_2$  or  $CH_2C(OH)(COOH)CH_2COOH$  or a derivative of a citric acid polymer.
9. A reactive dye compound according to any of Claims 6 to 8 wherein A is O.
10. A reactive dye compound having the structure:



wherein D, L, r are as defined above.

11. A reactive dye compound having the structure:



wherein D, L and r are as defined above

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12. Use of a compound according to any of Claims 1 to 11 for dyeing cellulosic substrates, preferably cotton.
13. Use of a compound according to any of Claims 1 to 11 for dyeing wool.
14. Use of a compound according to any of Claims 1 to 11 for dyeing polyamide substrates, preferably nylon.
15. Use of a compound according to any of Claims 1 to 11 for dyeing silk.
16. Use of a compound according to any of Claims 1 to 11 for dyeing keratin, preferably hair.
17. Use of a compound according to any of Claims 1 to 11 for dyeing leather.
18. Process for the preparation of a compound according to any of Claims 1 to 11 comprising the steps of reacting a first starting material (preferably one mole) with a second starting material (preferably one mole), the first starting material comprising at least one chromophore, at least one  $\text{SO}_2\text{C}_2\text{H}_4$  which is attached to the chromophore group either directly via the sulphur atom of the  $\text{SO}_2\text{C}_2\text{H}_4$  group or via a linking group L, the second starting material comprising an oxy- or thio-carbonyl group.
19. Process according to Claim 18 wherein the process is carried out at a pH of from about 2 to about 8, preferably from about 3 to about 5.
20. Process according to Claim 18 or 19 wherein the second starting material is added to the first starting material slowly, preferably dropwise, preferably over several hours, preferably 1-5 hours, more preferably 2-3 hours.
21. Product obtainable by a process according to any of Claims 18 to 20.
22. A dye composition comprising the compound or product of any of Claims 1 to 11 or 18 to 21.

- 23. A dye composition according to Claim 22 wherein the composition is in the form of a solid mixture and further comprises an acid buffer.
- 24. A dye composition according to Claim 22 wherein the composition is in the form of a liquid and further comprises water and an acid buffer.
- 25. A dye composition according to Claim 22 wherein the composition is in the form of a paste and further comprises water, thickening agent and an acid buffer.
- 26. A dye composition according to Claim 22, 23, or 25 wherein the pH is preferably from about 2 to about 3.